REMARKS

This Response is being filed in response to the Office Action mailed from the U.S. Patent and Trademark Office on December 4, 2006, in which claims 1-6, 8-24 and 55-84 were rejected. Applicants respectfully request reconsideration and allowance of pending claims 1-6, 8-24 and 55-84 in view of the remarks below.

Rejection Under 35 U.S.C. 112

The Office Action has rejected all the pending claims under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Office Action states that "There is no clear support for the newly claimed range of 'at least three' nanostructures in the specification to the exclusion of two nanostructures." (Office Action, page 2, paragraph 2). This assertion is believed to be without merit as at least three nanostructures is supported by Applicants' specification as filed

In particular, support for at least three nanostructures can be found throughout the Applicants' specification and drawings as filed including, but not limited to, page 5, lines 1-3, and page 25, lines 3-4 as shown below.

> "In yet another aspect, the present invention also provides hierarchical nanostructures having a ternary composition wherein the symmetric metal oxide material is formed form **three or more** metallic oxides." (Applicants' specification, page 5, lines 1-3)(emphasis added).

> "The present invention also provides hierarchical nanostructures having a ternary composition wherein the symmetric metal oxide material is formed from **three** metallic oxides." (Applicants' specification, page 25, lines 3-4))(emphasis added).

Also, the Amendment filed September 5, 2006 on page 13 listed the support for the amendment as follows: "Support for this amendment is found throughout Applicants' specification and drawings as filed, including but not limited to page 5, lines 9-12; page 21, lines 10-19; page 24, line 18 - page 25, line 2, and page 25, lines 3-12 of the specification and FIGS. 2(h), 10(h) and 38(c), among others. No new matter is added with this Amendment." (Amendment filed September 5, 2006, page 13).

Accordingly, support for at least three nanostructures can be found throughout the Applicants' specification as filed. Thus, the Section 112 rejection should be reconsidered and withdrawn.

Rejections Under 35 U.S.C. 103

The Office Action has rejected claims 1-5, 8-10, 12-23, 55-57, 60-61, 63-70, and 72-80 under 35 U.S.C. § 103(a) as being obvious by U.S. Patent No. 6,996,147 to Majumdar et al ("the Majumdar '147 patent"). The Office Action has also rejected claims 6, 58 and 71 under 35 U.S.C. § 103(a) as being obvious over the '147 Majumdar patent in view of U.S. Patent Publication No. 2004/0131537 to Yang. The Office Action has also rejected claims 6, 11, 58-59 and 71 under 35 U.S.C. § 103(a) as being obvious over the '147 Majumdar patent in view of U.S. Patent No. 6,586,095 to Wang. For the reasons below, these rejections are believed to be without merit.

"Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art." M.P.E.P. 2143.01. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab,* 217 F.3d 1365, 1370, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); *In re Lee*, 277 F.3d 1338, 1342-44, 61 U.S.P.Q.2d 1430, 1433-44 (Fed. Cir. 2002); *In re Jones*, 958 F.2d 347, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992); M.P.E.P. 2143.01.

Independent claims 1, 68, and 80 recite at least three second metallic oxides attached to the first metallic oxide between a first end and a second end of the first metallic oxide, and independent claim 55 recites at least three nanostructures attached to the central nanostructure between a first end and a second end of the central nanostructure. Having at least three nanostructures attached to the central nanostructure between a first end and a second end of the central nanostructure is neither disclosed, suggested or made obvious by the Majumdar '147 patent. Thus, reconsideration and allowance of pending claims 1-6, 8-24 and 55-84 is respectfully requested.

The Majumdar '147 patent describes methods of fabricating nanostructures and nanowires and devices fabricated therefrom. In particular, Majumdar FIG. 34 and FIG.

35 disclose a 3-terminal device. Majumdar FIG. 34 shows a first embodiment of a 3-terminal nanowire device having a T shape in which terminal T_2 and T_3 extend from an end of terminal T_1. Majumdar FIG. 35 shows a second embodiment of a 3-terminal nanowire device having a Y shape in which terminal T_2 and T_3 extend from an end of terminal T_1. (Majumdar '147 patent, col. 5, lines 42-47). In Majumdar FIG. 34 and FIG. 35, the 3-terminal device "could be utilized with two terminals acting as source and drain and the third acting as a gate." (Majumdar '147 patent, col. 32, line 65 - col. 33, line 1). In the Majumdar '147 patent, the two terminals are the ends of the nanostructure extending from the central nanowire and the third terminal is an end of the central nanowire. Thus, the Majumdar '147 patent discloses only two nanostructures extending from and beyond an end of the central nanowire.

In contrast to the invention recited in the independent claims 1, 68 and 80, Majumdar does not teach or suggest at least three second metallic oxides attached to the first metallic oxide between a first end and a second end of the first metallic oxide. Nor does Majumdar teach or suggest at least three nanostructures attached to the central nanostructure between a first end and a second end of the central nanostructure as recited in independent claim 55. The Office Action acknowledges that Majumdar does not teach at least three second metallic oxides by stating, **"The reference does not specifically teach at least three second metallic oxides."** (Office Action, page 3, paragraph 3)(emphasis added). Applicants agree with the Office Action's statement that the Majumdar '147 patent does NOT teach at least three second metallic oxides. The Majumdar '147 patent discloses only two nanostructures extending from and beyond an end of the central nanowire. In fact, as shown in FIG. 34 and FIG. 35, Majumdar teaches away from the claimed invention by illustrating that the two nanostructures extend only from an **END** of the central nanowire. Nowhere does Majumdar teach or suggest attaching at least three nanostructures, or any nanostructures for that matter, **BETWEEN** a **first end** and a **second end** of a central nanostructure.

Contrary to the Office Action's assertion that "it would have been obvious to one of ordinary skill in the art to attach at least three metal oxides or nanostructures to the central nanostructure ...", Majumdar does not teach, suggest or provide any reason or motivation to attach the metal oxides or nanostructures between a first end and a second

end of the central nanostructure. Rather, Majumdar teaches creating multi-terminal devices by attaching two nanostructures to only an end of the central nanowire.

Unlike Majumdar, Applicants' independent claims 1, 68 and 80 recite at least three second metallic oxides attached to the first metallic oxide between a first end and a second end of the first metallic oxide. A non-obvious motivation for doing so is disclosed in the Applicants' specification on page 25, lines 3-11. Specifically, a large amount of random hierarchical nanostructures can be obtained from ternary compositions, in which the metal oxide material is formed from three metallic oxides. Majumdar provides no such teaching, suggestion, or motivation for three nanostructures attached to the central nanostructure between a first end and a second end of the central nanostructure. Therefore, having at least three nanostructures attached to the central nanostructure between a first end and a second end of the central nanostructure is not made obvious by the Majumdar '147 patent. Thus, reconsideration and allowance of pending claims 1-6, 8-24 and 55-84 is respectfully requested.

The Office Action has also rejected claims 6, 58 and 71 under 35 U.S.C. § 103(a) as being obvious over the '147 Majumdar patent in view of U.S. Patent Publication No. 2004/0131537 to Yang. The additional cited reference of the Yang Publication No. 2004/0131537 does not cure or offer a suggestion on how to overcome the deficiencies of the Majumdar '147 patent discussed above. The Yang Publication No. 2004/0131537 discloses functional bimorph composite nanotapes and methods of fabrication. The Office Action described the Yang Publication No. 2004/0131537 as follows: "Yang teaches a nanoribbon used as an actuator that is doped with Tin (abstract)." (Office Action, page 5, paragraph 17). The Yang Publication No. 2004/0131537 does not disclose or suggest at least three nanostructures attached to a central nanostructure. The Majumdar '147 patent in combination with the Yang Publication No. 2004/0131537 does NOT disclose, suggest or make obvious at least three nanostructures attached to a central nanostructure between a first end and a second end of the central nanostructure, and therefore cannot render the claimed invention obvious. Applicants respectfully request reconsideration and withdrawal of the obviousness rejection as it applies to claims 6, 58 and 71.

The Office Action has also rejected claims 6, 11, 58-59 and 71 under 35 U.S.C. § 103(a) as being obvious over the '147 Majumdar patent in view of U.S. Patent No. 6,586,095 to Wang. The additional cited reference of the Wang '095 patent does not cure or offer a suggestion on how to overcome the deficiencies of the Majumdar '147 patent discussed above. The Wang '095 patent discloses semiconducting oxide nanostructures. The Office Action described the Wang '095 patent as follows: "Wang teaches a Tin-doped oxide nanostructure where the nanostructured oxide is Indium oxide (ITO) are used as films for flat panel displays (column 1 line 18-28)." (Office Action, page 6, paragraph 21). The Wang '095 patent does not disclose or suggest at least three nanostructures attached to a central nanostructure between a first end and a second end of the central nanostructure. The Majumdar '147 patent in combination with the Wang '095 patent does NOT disclose, suggest or make obvious at least three nanostructures attached to a central nanostructure, and therefore cannot render the claimed invention obvious. Applicants respectfully request reconsideration and withdrawal of the obviousness rejection as it applies to claims 6, 11, 58-59 and 71.

In view of the foregoing, it is clear that the cited prior art references, alone or in combination, do not to teach, suggest or make obvious the invention recited in the independent claims 1, 55, 68, and 80. Applicants therefore respectfully request that the rejection of independent claims 1, 55, 68, and 80 be reconsidered and withdrawn. Applicants also respectfully request that that the rejection of claims 2-6 and 8-25 that depend either directly or indirectly from independent claim 1, claims 56-67 that depend either directly or indirectly from independent claim 55, claims 69-79 that depend either directly or indirectly from independent claim 68, and claims 81-84 that depend either directly or indirectly from independent claim 80, be reconsidered and withdrawn.

Applicants respectfully request reconsideration and allowance of pending claims 1-6, 8-24 and 55-84. Applicants have made an earnest effort to respond to all issues raised in the Office Action of December 4, 2006, and to place all claims presented in condition for allowance. No amendment made was for the purpose of narrowing the scope of any claim, unless Applicants have argued herein that such amendment was made to distinguish over a particular reference or combination of references.

Applicants submit that all claims have been placed in a condition for allowance, and respectfully request an early and favorable action by the Examiner. If the Examiner believes that a telephone conversation with Applicants' attorney would expedite prosecution of this application, the Examiner is cordially invited to call the undersigned attorney of record.

Respectfully submitted,

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